The PsyScope experiment-building system

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Abstract—PsyScope is a system for building behavioral experiments on the Apple Macintosh computer using a graphic user interface that requires no computer programming. The program supports a wide variety of experimental designs, multimedia formats, and stimulus control. A freeware version is available at the author’s web site.

1. DESCRIPTION

PsyScope is a system for building behavioral experiments on the Apple Macintosh computer. Many researchers have developed systems for laboratory timing and stimulus presentation using this computer (Chute, 1986; Bharucha et al., 1987; Westall et al., 1989; Rensink, 1990; Enns and Rensink, 1991; Busey, 1992; Doenias et al., 1992; Goolkasian, 1993; Haxby et al., 1993). Of the various experiment-building systems currently available, both on the Macintosh and the IBM-PC (Schneider, 1988), PsyScope is one of the most complete and powerful (Cohen et al., 1993). Moreover, all of its basic functions can be accessed by the non-programmer user through a graphic user interface (GUI) that requires no experience with computer programming. Advanced users can modify the operation of the program by using the underlying structured programming language called PsyScript. Programmers can also extend the program by building plug-ins called PSYX extensions.

PsyScope is made available in two forms. As freeware, it can be retrieved from the authors' web site or from mirrors that are maintained in Japan and Belgium. Researchers who wish to use PsyScope as freeware have access to a full, working version of the program, the manual, and related resources. However, no help or support is provided for freeware users. Researchers who wish to use the newer PowerPC version of the program, who want to support the development effort, who want to use the QuickTime or EEG control plug-ins, or who have special support needs are encouraged to join the non-profit PsyScope consortium. The current fee for consortium membership is $750 for the first machine and $125 for each additional
machine. Further information regarding consortium membership can be found at the authors' web site.

Because of its extensive facilities for controlling stimulus placement and sequencing, PsyScope is well-suited to work in the area of vision and psychophysics, as well as other parts of experimental psychology that focus on basic information processes and reaction-time methods. Because picture stimuli can be preloaded into memory, the display of pictures is limited by the power of the computer, rather than by the workings of the program. A graphic element, called the ‘Factor Table’, allows the user to represent the basic within-subject design types in terms of crossing and nestings of rows and columns. Possible designs include Latin square, Graeco-Latin square, blocked, nested, linked, matched, random factor, fixed factor, and all other major design types. Between-group factors and blocking factors can be controlled through a separate higher level of icon types. The actual events in a given trial can be determined by moving icons representing times and stimuli in an ‘event template’ window, based on the notion of time as moving left to right.

2. SAMPLE SCRIPTS

A variety of basic experiment types have been implemented as examples for students and are available at our web site. These include classic experiments such as Stroop, Encoding Specificity, Signal Detection, Mental Rotation, to cite just a few examples of the 30 different sample paradigms for which student scripts are available. Students can easily modify these sample scripts using the GUI to change stimulus duration, font size, screen placement, and other variables. A separate Macintosh application that facilitates analysis of the output from PsyScope is the PsyDat program which allows the user to tabulate means, trim outliers, and reformat groups of data output files in preparation for more extensive further analysis by programs such as SPSS, StatView, or SuperANOVA.

3. CODING FORMATS

PsyScope supports all of the major coding formats: it is capable of playing digitized sound or speech in AIFF, SDII, or SoundEdit16 formats; it can present words in Roman or non-Roman alphabets; it can display PICT and TIFF format, as well as QuickTime animations. For researchers who need full precise control over experimental timing, PsyScope can be run in conjunction with a piece of external hardware called the ‘PsyScope button box’ which provides timing accurate to one millisecond. The low-level timing routines required for this box and for the precise control of the screen have been worked out in detail and have been thoroughly tested on all machines in the Macintosh line. The only current limitation in timing relates to the fact that computers using Apple 3.0 Sound Manager will have a delay in the actual playing of sounds which must be calibrated separately for each machine type.